

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C.

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In the Matter of

Review of the Commission's Rules and
Policies Existing Affecting the Conversion
to Digital Television

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MM Docket No. 00-39

COMMENTS OF SINCLAIR BROADCAST GROUP, INC.

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Dated: May 17, 2000

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Summary

More than seven months ago, in October 1999, Sinclair Broadcast Group, Inc. (“Sinclair”) filed a Petition for Expedited Rulemaking (the “Petition”) with the Commission, urging it to modify its digital television (“DTV”) rules and give DTV broadcasters the flexibility to transmit their digital signals using COFDM digital modulation technology. Having identified serious problems with the existing ATSC 8-VSB standard, Sinclair attempted to move the Commission and the broadcast industry toward a comprehensive and lasting solution. After four months of silence, the Commission dismissed the Petition without placing it on public notice on February 4, 2000. Now, as promised, the Commission in its Biennial Review NPRM asks for comment on issues related to the DTV modulation standard. For the reasons below, Sinclair once again urges the Commission to initiate a rulemaking to establish a dual-mode DTV modulation standard that will permit broadcasters to operate using COFDM-based technology.

The advent of digital technology has created vast new opportunities in all areas of telecommunications. With the shift to DTV, broadcasters, like other licensees, expected to have the flexibility to move forward with a variety of new business plans and strategies, and many are now preparing for that course with an entrepreneurial energy not seen in the broadcast industry for some time. With an eye towards the future, broadcasters are forming partnerships with a variety of technology providers, seeking innovative ways to use their digital spectrum to better serve consumers and their local communities, including ways that would reduce the importance of the weekly Nielsen ratings. At this early stage of digital development, it would be irresponsible for the Commission to stifle this new energy by condemning broadcasters alone to a technology that limits them to one, narrow business plan: a fixed, rigid, residence-based, rooftop-antenna-delivered video service. If the Commission maintains exclusive reliance on the

ATSC 8-VSB standard and deprives broadcasters of this singular opportunity to once more make their spectrum relevant, that stance will be a gross disservice both to those licensees and the public.

Certainly, by any measure, the DTV conversion has to this point been a failure. The Consumer Electronic Association indicates that approximately 34,000 DTV receivers capable of receiving 8-VSB DTV service have been sold in the United States (only one-thirtieth of one percent of U.S. TV households), and even the majority of these units were likely purchased by consumer electronics distributors and retailers rather than consumers themselves. While CEA and other proponents of the status quo claim that this minimal DTV development is the result of a shortage of DTV content, neither the Commission nor the public should be fooled; the fundamental reason for the current failure of the DTV transition is the inability of ATSC 8-VSB broadcasters to overcome complex multipath conditions and provide ease of reception and ubiquitous, reliable over-the-air service to viewers using simple, consumer-grade antennas in broadcasters' core business areas.

Sinclair's own ATSC 8-VSB field trials in Baltimore in the spring and summer of 1999 demonstrated the existence of this fundamental flaw in ATSC 8-VSB reception, and Sinclair's findings have since been confirmed by NBC and others. Indeed, it appears that the ATSC 8-VSB DTV standard does not offer the minimum set of capabilities that should be provided by a DTV system in any country. 8-VSB broadcasters will fail to replicate their NTSC reception, and consumers forced to receive DTV service through multiple large steerable rooftop antennas will lose "channel surfing" capability and other viewing functionality in markets with non-allocated DTV stations. The inability of ATSC 8-VSB receivers to overcome complex multipath effects also greatly limits the potential use of on-channel retransmission methods, operations that could

potentially expand access to DTV and enhance spectrum efficiency. In addition, given ATSC 8-VSB's forever-frozen data rate of 19.39 Mbps and the absence of hierarchical modulation capability, it appears that 8-VSB for the foreseeable future will not permit the provision of the portable video services that are available today in the NTSC environment.

As a result of all these factors, consumer acceptance of DTV has been and will be stunted, raising the distinct possibility that the critical eighty-five percent market penetration threshold will never be reached in most TV markets. Even if the DTV transition were completed, maintenance of the status quo would endanger the viability of free over-the-air television service, because an overwhelming majority of television households in the U.S. would be forced to subscribe to cable or satellite service in order to receive what should be a free signal.

Many equipment and chipset manufacturers maintain that the ATSC 8-VSB standard is not fatally flawed, and continue to promise that major improvements in ATSC 8-VSB reception are imminent. The most egregious examples of unsubstantiated self-promotion during the past year were the sweeping claims last August from Motorola and NxtWave regarding the development of the so-called "Miracle Chips." For instance, NxtWave, a company with no proven track record of success and with a deep and abiding financial interest in 8-VSB technology, claimed that its chip would "provide the highest reliability and performance available," and "cancel transmission channel impairments such as static and dynamic multipath." Neither NxtWave nor Motorola has ever provided any evidence, publicly or privately, from actual field tests that these "breakthrough" chips resolve the 8-VSB reception problem under real-world conditions, and it now appears that the publicity over these chips was nothing more than a means for buying time and delaying the implementation of a real solution. In fact, Motorola conceded in a late 1999 test report that real-world multipath conditions are much more

complicated than those generated in the laboratory, and that its chip product was not successful in overcoming these conditions. Unfortunately, NxtWave and its CEO, Matt Miller, are continuing their strategy with new claims regarding a next-generation “breakthrough.”

It would be irresponsible for the Commission to continue relying on meaningless and self-serving marketing claims based on nothing but hypothetical mathematical formulas and controlled laboratory analyses. On the issue of DTV modulation, the Commission should no longer follow the advice of entities that either have intellectual property interests in ATSC 8-VSB technology or merely wish to sell digital displays to consumers without regard to the delivery mechanism for those digital signals.

Instead, in determining its DTV policies, the Commission should give considerable weight to the views and interests of its broadcast licensees. It is broadcasters that have been required to make a huge investment in the digital conversion and that have the most to lose if the DTV transition fails. **Now, broadcasters in virtually every market, representing half of all licensed stations, openly favor a Commission decision to establish a dual-mode DTV modulation standard that permits the use of COFDM technology.**

COFDM, which unlike ATSC 8-VSB has proven capabilities to match the claims regarding its performance, enables broadcasters to provide a service that more than meets the minimum requirements of a DTV system. Broadcasters using COFDM would be able to overcome complex multipath conditions and provide ease of reception and reliable over-the-air DTV service, including HDTV, to viewers using simple antennas within their stations’ core business areas. In addition, COFDM permits hierarchical modulation, enabling broadcasters to simultaneously transmit an HDTV programming stream and a portable Standard Definition programming stream. There is also no ceiling on COFDM data rates, unlike with the ATSC 8-

VSF standard, and further development of COFDM over the next decade may allow easy and reliable reception of COFDM at data rates of 24 Mbps and higher. Finally, in contrast to ATSC 8-VSB, COFDM will permit on-channel retransmission methods, potentially giving the Commission an important new spectrum management tool. All of these factors have led the majority of countries around the world to adopt a COFDM-based DTV standard, and these capabilities would no doubt stimulate consumer acceptance of DTV in the U.S.

In rejecting Sinclair's Petition, the Commission concluded that a rulemaking process to modify the DTV modulation standard would result in a multi-year delay of the DTV roll-out. There is no evidence for that conclusion, however, and Sinclair believes that if the Commission decided to permit U.S. broadcasters to operate using the COFDM-based DVB-T standard, implementation of that standard as an alternative to ATSC 8-VSB would likely take little more than a year. Certainly, the initiation of such a regulatory process would bear a smaller risk of meaningful delay than continued reliance on the unsubstantiated and speculative claims of receiver and chipset manufacturers.

In addition, the benefits of having a single standard -- also cited by the Commission -- no longer justify exclusive reliance on the ATSC 8-VSB standard. Adherence to this regulatory principle is clearly counterproductive if, as here, the technology in question has been shown not to work. In addition, a flexible modulation standard would actually be consistent with the Commission's overall approach to DTV technology as well as its approach to regulating almost all other communications services, where licensees have access to a variety of transmission technologies. It is time for Commission to rely on the marketplace to decide the future roles of COFDM and 8-VSB in the broadcast industry.

As Commissioner Susan Ness herself said in January 2000, “If improvements are not made that address the issues that are raised by Sinclair, then we need to think about other steps that should be taken.” That time has now arrived. The broadcast industry, American consumers, and the U.S. government all have an enormous stake in a successful DTV transition, and the Commission simply cannot afford **not** to initiate a new proceeding to reexamine the current DTV modulation standard.

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Sinclair Broadcast Group, Inc. ("Sinclair") hereby comments on the Commission's Notice of Proposed Rulemaking ("NPRM") in the above-captioned review of its policies regarding the conversion of the broadcast industry to digital television ("DTV"). In October 1999, Sinclair filed a Petition for Expedited Rulemaking (the "Petition") with the Commission, urging it to modify its DTV rules and give broadcasters the flexibility to transmit their digital signals using COFDM digital modulation technology. Now, more than seven months later, after opposition from the equipment manufacturer community and the Commission's February dismissal of the Petition, the Commission finally seeks public comment on these DTV modulation issues in its Biennial Review NPRM. Since the filing of the Petition, the DTV transition has remained stalled, while evidence of the inadequacy of the ATSC 8-VSB standard continues to accumulate. The meaningless and self-serving claims from receiver and chipset manufacturers notwithstanding, it remains the case that only a COFDM-based modulation standard would permit ease of reception and reliable over-the-air service to consumers with simple antennas in broadcasters' core areas. Given the enormous stake of the broadcast industry and American consumers in a successful DTV transition, the Commission should finally move forward and initiate a proceeding to modify the current DTV modulation standard.

Background

Sinclair. Sinclair is a publicly traded company with thousands of shareholders and a multi-billion dollar market capitalization. It is among the nation's largest group television owners, owning, applying for, or programming sixty-two commercial television stations. Given the magnitude of its broadcast interests, Sinclair has a huge stake in the development of DTV.¹ Sinclair is committed to the rapid introduction of DTV technology, and hopes to provide viewers with a quality of service that exceeds that offered in today's analog world. While Sinclair continues to urge the Commission to permit broadcasters to operate using COFDM technology, Sinclair has already invested millions of dollars to upgrade its facilities and expects to spend a total of \$300 million during this conversion. Sinclair is prepared to operate consistent with the existing ATSC DTV standard and meet all applicable DTV implementation deadlines.

Sinclair's Discovery of the ATSC 8-VSB Reception Problem. Sinclair first detected the existence of an ATSC 8-VSB reception problem during DTV multicasting tests in July 1998. At that time, Sinclair discovered that it was difficult to receive an ATSC 8-VSB DTV picture even though its transmitter was just three miles away and its signal was quite strong at the test location. As a result, Sinclair was forced to use a sophisticated rooftop-mounted, outdoor directional antenna for this demonstration. Subsequent informal testing provided additional evidence of this problem, and Sinclair set out in March 1999 to conduct a more comprehensive

¹ Even prior to filing its Petition, Sinclair had been an extremely active commenter before the Commission and Congress in matters relating to digital television. In particular, Sinclair was one of the first broadcasters to recognize that the low DTV power levels assigned to UHF stations would prevent these stations from providing adequate service to their core market areas, and was at the forefront of the effort that led the Commission to raise its DTV power ceiling for these UHF licensees. *See* Petition for Reconsideration, Sinclair Broadcast Group, Inc., MM Docket No. 87-268 (June 13, 1997); Memorandum Opinion and Order on Reconsideration of the Sixth Report and Order, Advanced Television Systems and Their Impact on the Existing Television Broadcast Services, 13 FCC Rcd 7418, paras. 58-85 (1998).

examination of the ease of reception of ATSC 8-VSB signals compared to NTSC signals, this time using commercially available DTV receivers. Sinclair designed tests in Philadelphia to measure and compare the receivability of these stations' UHF DTV 8-VSB signals to UHF NTSC signals being transmitted from the same site. In these tests, ATSC 8-VSB signals generally were not receivable with simple antennas in indoor environments where NTSC signals enjoyed strong, acceptable reception. As indicated below, this result was subsequently confirmed by NBC and General Electric.

The ATSC 8-VSB reception problems evident in the Philadelphia field trials prompted Sinclair to explore alternative transmission systems. In particular, Sinclair was aware of the ongoing development of Coded Orthogonal Frequency Division Multiplexing ("COFDM") technology in Europe and other parts of the world. At the 1999 National Association of Broadcasters ("NAB") convention in Las Vegas, Sinclair worked with the Digital Video Broadcasting Project ("DVB") (discussed further below) to transmit a COFDM signal at an HDTV data rate of approximately 18.7 Mbps over a 6 MHz channel. Subsequently, in the spring and summer of 1999, Sinclair designed and conducted field trials in Baltimore to compare the ability of COFDM-based and ATSC 8-VSB systems to deliver HDTV service over a 6 MHz channel to simple consumer-grade antennas under real-world conditions. In September 1999, Sinclair published its report on these tests.² As discussed further in these comments, Sinclair's study demonstrated that an 8-VSB signal generally could not be received reliably with a simple antenna in a station's core business area under real-world, complex multipath conditions. In

² "Comparative Reception Testing of 8-VSB and COFDM in Baltimore," Nat Ostroff, Vice President New Technology, Sinclair Broadcast Group, and Mark Aitken, Advanced Technology Group, Sinclair Broadcast Group (September 24, 1999) ("*Comparative Study*").

contrast, use of COFDM technology overcame the effects of dynamic multipath environments and permitted ease of reception and reliable over-the-air service to viewers using simple antennas in broadcasters' core business areas.

The Development of COFDM. In the DTV rulemaking, the Advisory Committee on Advanced Television Service and the Commission chose not to implement COFDM technology, then in its early stages of development, into the ATSC DTV standard. Since the Commission's 1996 selection of 8-VSB, there have been significant advancements in COFDM modulation technology. DVB , a global organization consisting of broadcasters, manufacturers, network operators, and regulatory bodies, began work on this technology in 1995. In 1997, DVB finalized its "DVB-T" digital television transmission format, and this standard was approved by the European Telecommunications Standards Institute ("ETSI") in February 1997. The manufacture of commercial COFDM decoder chips began in 1997, and COFDM chips were available for installation into commercial DTV receivers in 1998. The DVB-developed DTV transmission system is highly sophisticated, supporting 120 different operational modes, HDTV service, multichannel SDTV services, mobile television applications, and reliable reception with simple antennas.

The benefits of COFDM have led numerous countries all over the world to adopt this technology for their digital television systems. Sinclair is aware that COFDM has to date been selected as the DTV modulation standard in the all of the European Union nations, including Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, and the United Kingdom ("U.K."). COFDM has also

been chosen for digital modulation in Australia, India, Japan,³ and Singapore. In particular, the U.K.'s DTV service, called "OnDigital," began service in November 1998, and approximately half a million TV households in the U.K. are now enjoying reliable, robust DTV reception through simple antennas. Australia, Brazil, and Singapore each conducted an exhaustive, head-to-head laboratory and field trial comparison between 8-VSB and COFDM.⁴ COFDM was chosen in each instance, because these administrations concluded that it permitted a more modern DTV transmission that would provide ease of reception for all classes of consumers across a variety of TV reception environments. In the near term, COFDM will be adopted by countries with an aggregate market potential exceeding 300 million television households, three times the current size of the U.S. television market.

Sinclair's Petition. On October 8, 1999, Sinclair filed its Petition for Expedited Rulemaking urging the Commission to amend its DTV rules to allow broadcasters the flexibility to transmit their DTV signals using either COFDM or ATSC 8-VSB modulation technology.⁵ The Petition reported the above-described results of Sinclair's 8-VSB/COFDM field trials, focusing on the critical implications of the failure of the ATSC 8-VSB standard to permit ease of reception and reliable over-the-air service through simple, consumer-grade antennas. Sinclair also pointed out that COFDM would permit portable video services, unlike ATSC 8-VSB, and that while 8-VSB has a frozen data rate of 19.39 Mbps, COFDM has no such long-term

³ In Japan, broadcasters will utilize an alternative COFDM DTV system developed by ISDB; the ISDB standardization process has recently been completed, and ISDB-developed decoder chips will become commercially available in the near future.

⁴ The Australia tests involved COFDM transmissions over 7 MHz channels, while Singapore's tests involved COFDM transmissions over 8 MHz channels. The Brazilian administration's tests were the first government tests comparing the reception of COFDM and 8-VSB signals over 6 MHz channels.

⁵ Petition for Expedited Rulemaking, Sinclair Broadcast Group, Inc. (October 8, 1999) ("Petition").

limitation and offers greater potential for technological improvement. In order to revitalize consumer interest in DTV and rescue the DTV transition, Sinclair asked the Commission to appoint an industry task force to determine the most effective and efficient way to make the benefits of COFDM DTV technology available to U.S. broadcast viewers.

At the time of its filing, Sinclair's Petition was supported by broadcast companies (including Sinclair) representing the licensees of approximately 200 commercial TV stations, and within weeks this support grew to include companies controlling more than 400 commercial and public TV stations. The Petition was formally opposed only by the Consumer Electronics Association ("CEA"), which argued that Sinclair failed to present convincing evidence that a new rulemaking on the DTV modulation standard was warranted.⁶

The OET Report on DTV Modulation. Prior to the filing of Sinclair's Petition, Commissioner Susan Ness responded to broadcasters' concerns about ATSC 8-VSB reception by asking the Commission's Office of Engineering and Technology ("OET") to issue a comparative analysis of ATSC 8-VSB and COFDM. The OET's report was released on September 30, 1999, just one week prior to submission of the Petition.⁷ Without conducting any tests or considering the possibility of a dual-mode standard, OET concluded that the ATSC 8-VSB standard should not be replaced by COFDM. OET found that COFDM and ATSC 8-VSB each have their own unique advantages and disadvantages, with the relative performance of these technologies varying on a market-by-market and station-by-station basis, but concluded that the cost of switching from ATSC 8-VSB to COFDM would outweigh any potential benefits from that shift.

⁶ Interestingly, CEA offered no evidence that 8-VSB provides ease of reception and reliable over-the-air service to viewers using a simple antenna.

⁷ See "DTV Report on COFDM and 8-VSB Performance," Office of Engineering and Technology, Federal Communications Commission, FCC/OET 99-2 (September 30, 1999) ("OET Report").

OET did note, however, that COFDM today provides superior indoor reception under static and dynamic multipath conditions, that COFDM as well as ATSC 8-VSB can support a viable HDTV service, and that COFDM is unlikely to cause greater interference than 8-VSB, even at higher power levels. *Id.* at 16-18. In response to the OET Report, Sinclair filed comments pointing out a variety of erroneous statements by OET, including its assumptions that (i) COFDM data transmission over a 6 MHz channel is limited to 18.67 Mbps, (ii) dynamic multipath conditions are relevant only to mobile reception, and (iii) some amount of indoor antenna manipulation is consistent with satisfactory quality of service.⁸

The Commission's Dismissal of the Sinclair Petition. For almost four months, the Commission was silent regarding the Sinclair Petition, leading to great speculation within the broadcast industry about how it would be processed. Finally, on February 4, 2000, the Commission responded by dismissing the Petition and affirming the analysis and recommendations of OET.⁹ Despite Sinclair's test data, the Commission concluded that ATSC 8-VSB receivers would someday operate satisfactorily in strong multipath conditions and that ATSC 8-VSB broadcasters would be able to replicate their NTSC service. *Letter Order* at 4. While acknowledging the shortcomings of early DTV receivers, the Commission indicated that chip-set manufacturers such as Motorola and NxtWave Communications, Inc. ("NxtWave") were developing reasonable and immediate solutions to the multipath interference issues. *Id.* The Commission also noted its finding during the DTV rulemaking that a single system standard would minimize consumer confusion and speed DTV implementation. *Id.* at 3. Despite these

⁸ See Sinclair Broadcasting Group, Comments on DTV Report of FCC Office of Engineering and Technology (October 14, 1999).

⁹ Letter to Martin R. Leader Denying Petition for Expedited Rulemaking, FCC 00-35, at 4 (February 2, 2000) ("*Letter Order*").

conclusions, the Commission commended Sinclair for its efforts and noted the importance of the issues raised by the Petition. While it declined to place the Petition on public notice, the Commission indicated that it would address these modulation issues further in its upcoming DTV biennial review proceeding issues. *Id.*

Growing Acknowledgment of the ATSC 8-VSB Reception Problem. Since the Commission's February dismissal of Sinclair's Petition, a growing number of parties have formally acknowledged that there is a serious problem with ATSC 8-VSB reception. Less than two weeks after this dismissal, NBC and the General Electric Corporation announced that their own tests in Philadelphia and Washington, D.C. demonstrated serious problems with ATSC 8-VSB reception by DTV receivers using indoor antennas. According to NBC, NTSC analog reception is currently far superior to 8-VSB reception, and NBC projected that it would be at least five years before 8-VSB service equaled the quality of current NTSC reception.¹⁰ In response, a representative of CEA, a primary opponent of Sinclair's Petition, conceded that he was unable to predict when ATSC 8-VSB reception would become comparable to the performance of NTSC analog receivers.¹¹ In April, CEA also conceded that only seventeen percent of all digital display devices that have been sold to U.S. consumers are capable of receiving ATSC 8-VSB service. As of May 1, 2000, CEA indicated that only 33,788 8-VSB receivers had been sold to the public, little more than one-thirtieth of one percent of the total population of U.S. TV households. (As indicated below, the majority of these units were purchased by consumer electronics distributors and retailers rather than consumers.)

¹⁰ See "GE test blows hole in DTV; Heaps more doubt on digital standard," *Electronic Media* (February 14, 2000).

¹¹ *Id.* at 4.

In late March, the ATSC announced the formation of a “Task Force of System Performance” to evaluate the performance of the ATSC 8-VSB modulation standard. The ATSC invited a wide variety of parties to participate in this process, including broadcasters, chip vendors, and consumer electronics manufacturers. The ATSC stated specifically that it wanted to reach out to Sinclair and other supporters of the Petition.¹² In early April, the Association of Maximum Service Television (“MSTV”) announced that it would conduct a six-month program of comparative testing of the performance of ATSC 8-VSB and COFDM, a process that will likely involve a large cross-section of broadcasters.¹³ NAB, a participant in both the ATSC and MSTV review processes, has also acknowledged the current 8-VSB reception problems, although its current position is that the Commission should establish receiver performance standards.¹⁴

This growing recognition regarding the limitations of ATSC 8-VSB extends outside the U.S. Specifically, in Argentina, which previously adopted the ATSC 8-VSB standard in November 1998, the Secretary for Communications recently announced the Argentinean government’s decision to reopen its selection process for a DTV modulation standard.¹⁵

Demonstration at the NAB Convention. At the NAB Convention in early April, 2000, Sinclair and DVB again worked together to demonstrate the capabilities of COFDM and DVB-T. Pursuant to an STA from the Commission, Sinclair’s Las Vegas station, KVWB, transmitted

¹² See “Task Force to Scrutinize DTV Reception,” TechWeb News (April 6, 2000); “ATSC Forms Task Force to Study RF System Performance,” Audio Week (March 27, 2000).

¹³ See “Broadcasters at NAB Press for Current DTV Standard, Cable Actions,” Communications Daily (April 11, 2000).

¹⁴ *Id.*

¹⁵ See, e.g. <http://www.ambitofinanciero.com/00-05-04/espectaculos001.htm>; <http://webstar.com/hdtv/argentinanewsrelease.html>.

simultaneously an HDTV programming stream received on a 60-inch plasma screen and a Standard Definition TV programming stream received by a laptop-sized portable Nokia DTV receiver. Both of these DVB-T programming streams were successfully received at the randomly-situated exhibition booth of the Aerodyne Communications, Inc. (NASDAQ, symbol ACRO), inside the steel and concrete Las Vegas Convention Center, seventeen miles from the KVWB transmitter site. (No 8-VSB signal could be received inside the same building.) This demonstration was open to all convention attendees, and was visited by Commission officials and representatives from various sectors of the broadcast and telecommunications industries. Various scurrilous ATSC 8-VSB proponents falsely claimed that Sinclair and DVB-T had achieved robust reception in the convention hall through the use of a COFDM booster facility, but this assertion was quickly discredited within full view of all observers at the Aerodyne booth.¹⁶ In fact, Sinclair and DVB confirmed the general robustness of COFDM reception from KVWB's facilities at numerous public demonstrations at random locations throughout the Las Vegas metropolitan area.

In contrast, Zenith in Las Vegas conducted a secret demonstration of ATSC 8-VSB performance in a carefully chosen, prequalified receiving environment, at the Venetian Hotel. Because this meeting was closed to the public, it was impossible for Sinclair or other uninvited entities to comment on or verify the results of this demonstration.

The Commission's Biennial Review NPRM. During the DTV rulemaking proceeding, the Commission established that it would conduct a review every two years to ensure that there was

¹⁶ See "DVB Tries to Upstage ATSC on the NAB Convention Floor," DTV Business (April 17, 2000).

sufficient progress in the DTV transition.¹⁷ The Commission stated that in these periodic reviews it would address issues raised by new technological developments or other unforeseen circumstances, and consider whether those events warrant modification of its DTV rules. In the first of these review notices released in March, the Commission invites comment on a number of issues currently facing the DTV transition, including tower siting, copyright protection, compatibility with cable operations, channel election requirements, and consideration of mutually exclusive applications.¹⁸ In addition, as promised, the Commission requests comments on issues that have been raised regarding the existing ATSC 8-VSB DTV modulation standard.¹⁹ While the Commission reiterates its view that the ATSC 8-VSB standard will enable broadcasters to replicate their NTSC service, it recognizes that many broadcasters, including Sinclair, have concerns regarding ATSC 8-VSB performance. Accordingly, the Commission asks for comment on the progress that has been made in improving ATSC 8-VSB reception and requests the submission of any new information or studies regarding 8-VSB reception performance.

Discussion

I. The ATSC Version of 8-VSB Is a Broken Technology That Is Causing the Failure of the DTV Transition, and the Commission Should Abandon Its Exclusive Reliance on This Standard

By all available measures the transition to broadcast DTV is a continuing failure, and the fundamental reason for this failure is clear: under the current DTV system, broadcasters are

¹⁷ See, e.g., Second Memorandum Opinion and Order on Reconsideration of the Fifth and Sixth Report and Orders, 14 FCC Rcd 1348 (1998)

¹⁸ In the Matter of Review of the Commission's Rules and Policies Affecting the Conversion to Digital Television, MM Docket No. 00-39, FCC 00-83 (March 8, 2000) (the "*Biennial Review NPRM*").

¹⁹ *Biennial Review NPRM* at paras. 11-12.

unable to provide ease of reception or ubiquitous, reliable over-the-air service to viewers using simple antennas in broadcasters' core business areas (Grade A contours). More than seven months after Sinclair filed its Petition and almost four months after the Petition was dismissed, this reality remains a compelling reason for the Commission to abandon its exclusive reliance on the ATSC 8-VSB standard.

A. The ATSC 8-VSB standard does not currently permit ease of reception or reliable over-the-air DTV service to viewers with simple antennas in broadcasters' core business areas

After more than fifty years of NTSC analog service, viewers of over-the-air broadcast television in the United States today expect a sufficient "ease of reception" of television programming. These viewers now expect their television sets to work "out of the box," without the need for complicated or time-consuming peripheral installations. Broadcast consumers rely heavily on simple, inexpensive antennas that can be deployed indoors on a relatively inconspicuous basis,²⁰ and these viewers are accustomed to practically instantaneous channel "surfing" made possible by omnidirectional reception (without antenna manipulation) and remote control devices. Given these expectations, broadcasters will have to do more than merely replicate their NTSC signal coverage in order to achieve a successful DTV transition; it is also critical that broadcasters provide DTV viewers with the greatest possible ease of reception and reliability of free over-the-air service.

In order to maximize ease of reception and reliability of service, DTV broadcasters must overcome the complex multipath conditions that are common to today's urban and suburban

²⁰ For example, in 1997, approximately seven million indoor antennas were sold in the U.S., while in 1996 6.3 million indoor antennas were purchased. The average price of these antennas of those antennas was approximately \$8. *See This Week in Consumer Electronics*, Vol. 13, No. 8 (March 16, 1998).

environments. Multipath effects result from the abundance of structures and objects, both natural and man-made, that can reflect a DTV signal. “Static” multipath effects result from the reflection of a DTV signal off of a stationary structure or object, while “dynamic” multipath effects are caused by reflections of a DTV signal off of moving objects.²¹ Dynamic multipath effects are particularly unpredictable and difficult to correct. While in the analog television environment, multipath effects lead only to picture “snow” and “ghosting,” multipath conditions in the DTV environment can cause complete loss of reception.

The ATSC 8-VSB standard was developed with the goal of replicating NTSC signal strength at HDTV data rates, rather than with a focus on the effects of multipath conditions. In fact, none of the laboratory tests of the ATSC 8-VSB standard to date address the usual multipath conditions in the field, which are multiple reflections of a similar strength and of a dynamic nature, otherwise known as Rayleigh channels. The ATSC 8-VSB design decision reflects the classic mistaken assumption that ample signal strength ensures high-quality reception, and this design choice has now proven costly. Studies by Sinclair and others demonstrate conclusively that, because of multipath effects, the ATSC 8-VSB standard today generally does not permit reliable over-the-air reception of DTV through simple antennas in broadcasters’ core business areas, in indoor or outdoor environments. In Sinclair’s field trials, there was successful reception of Sinclair’s 8-VSB signal through simple antennas little more than one-third of the time within the Grade A contour, and even where the 8-VSB signal was successfully received, the antenna could be subject to only limited reorientation before losing

²¹ “Static” multipath reflections include those off of walls and furniture within a house, the exterior of adjacent houses and buildings, lighting and electricity poles, and mountains and other nearby terrain, while “dynamic” multipath reflections include those off of moving people or animals, automobiles, aircraft, rain or other precipitation, moving

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reception. *Comparative Study* at 8-9. As indicated above, Sinclair's results were confirmed in February by NBC and General Electric, whose testing demonstrated that ATSC 8-VSB reception through simple antennas is currently far inferior to both NTSC analog reception and reception of COFDM-based signals.

Currently, there is no adjustment that a broadcaster can make to its transmissions to ameliorate these ATSC 8-VSB reception problems. An increase in transmission power, for instance, would not only fail to resolve these reception problems, it would likely exacerbate complex multipath effects across a larger portion of a broadcaster's core business area.

The *Biennial Review NPRM* misses the key issue facing the DTV transition when it asks whether DTV broadcasters should be required to replicate the Grade B coverage of their NTSC stations. *Biennial Review NPRM*, at para. 22. The Commission's priority should be replication of NTSC **reception**, not raw signal coverage; the Commission should be focusing on the steps necessary to ensure that broadcasters' signals are receivable in their core business areas under typical, consumer-grade viewing conditions. If the DTV transition fails, it will be because of the 8-VSB reception problem, not because of the absence of an explicit Grade B coverage replication requirement.²²

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leaves, and any wind-blown object, including wind-induced motion on receiving and transmitting antennas.

²² Even if the Commission decided to permit COFDM operations, Sinclair would not favor any type of early requirement. Just as NTSC coverage evolved over time, DTV coverage will also evolve replication as more households purchase DTV receivers and the market for DTV service grows. At the earliest, an NTSC Grade B contour replication requirement should go into effect only at the end of the DTV transition.

B. Exclusive reliance on the ATSC 8-vsbs standard means higher costs for U.S. consumers, limited viewing functionality, and excessive bargaining power for telecommunications gatekeepers

Given the reception problems described above, viewers in the U.S. will be forced to either install a large outdoor antenna or subscribe to cable or satellite service in order to gain access to broadcast DTV programming. First, for those households able and willing to mount a large outdoor antenna on the roof,²³ such installation will constitute a significant additional cost - a professionally-installed outdoor rooftop antenna typically costs approximately \$300 with installation, with an additional \$100 for rotor capability.²⁴ In addition, a significant proportion of the households that invest in a large antenna will suffer limited viewing functionality. This is because in markets with non-allocated DTV stations,²⁵ only outdoor antennas with rotating capability will have access to multiple stations' 8-VSB signals. These rotor antenna users will have to tolerate up to a thirty-second delay in reception²⁶ while their antennas rotate from one channel position to another.²⁷ This loss of instantaneous channel surfing capability is clearly

²³ Not all television households will even be able to deploy a large outdoor antenna. Millions of viewers living in multi-unit dwellings or in other forms of shared housing, particularly in urban areas, will not have access to the necessary rooftop space.

²⁴ Households with two or more television sets receiving broadcast service only would need a separate rotor antenna for each of those sets (assuming that viewers in those households want the ability to watch different stations simultaneously on multiple sets). Currently, almost 75% of all TV households in the U.S. own two or more television sets, and the average television household in the U.S. owns 2.4 television sets. *TV Dimensions* at 18.

²⁵ Technical, environmental, and commercial factors will prevent the collocation of DTV transmitters in a significant percentage of television markets.

²⁶ Rotor antennas typically rotate at approximately six degrees per second, with stations potentially oriented as far as 180 degrees apart.

²⁷ Reliance on this technology will also inhibit VCR usage. Specifically, viewers with rotor-equipped antennas will no longer be able to view programming on one channel while recording programming aired on another station. On average, fifteen percent of program recordings are made while viewers are watching a different channel. See *TV Dimensions* '99, Media Dynamics, Inc., at 153 (1999) ("*TV Dimensions*"). In addition, in markets with allocated stations, the "Picture-In-Picture" ("PIP") feature, a popular consumer accessory in television sets, will also be inoperable.

inconsistent with the Commission's general commitment to the deployment of advanced communications technologies.²⁸

Of course, once consumers become aware that they need to install a thirty-foot mast-mounted rooftop rotor antenna in order to get DTV service, they will likely turn to cable or Direct Broadcast Satellite ("DBS") service providers for digital television service both during and after the DTV transition, a result likely desired by a majority of equipment manufacturers. Clearly, this shift of potentially millions of television households to cable and satellite would jeopardize the viability of free, diverse, multiple-voice, local over-the-air broadcast television. In addition, like large outdoor antennas, cable and satellite service constitute a significant expense for consumers -- nationally, cable service costs an average of approximately \$25-30 per month, with a \$25-35 average minimum installation charge, while DBS installation on average costs between \$100 and \$200, with an average monthly service charge of approximately \$25 per month.

In addition, if 8-VSB remains the sole modulation standard, cable and satellite gatekeepers will gain excessive control over the programming that reaches the public and unreasonable bargaining power in the digital environment. Just recently, the potential for abuse of this gatekeeping power was made clear to the American public, when Time Warner refused to retransmit ABC's programming unless its parent company, Disney, agreed to certain contractual terms.²⁹ As a result, millions of viewers across the country lost access to ABC's programming

²⁸ See, e.g., Report in the Matter of Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996, CC Docket 98-146, FCC 99-5 (released February 2, 1999).

²⁹ See, e.g., <http://www.nytimes.com/yr/mo/day/news/financial/timewarner-assess.html>; Remarks by Chairman William Kennard, "Lessons from the front: When is Pulling the

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for almost two days. If the Commission continues its exclusive reliance on ATSC 8-VSB, broadcasters will likely lack a reliable, independent means of delivering their programming to the public, and cable and satellite gatekeepers will be much more likely to subject broadcasters to unreasonable demands during program access negotiations. In this scenario, programming blackouts might become a regular occurrence, an outcome greatly harmful to the public interest.

C. All available measures show little consumer interest in DTV, and this condition is unlikely to change if the commission maintains its exclusive reliance on the ATSC 8-VSB standard

All available data regarding current DTV utilization supports the common sense proposition that if a technology does not work, the public will not embrace it. The most compelling evidence for this proposition in the DTV context is the minimal amount of DTV receivers currently being used to receive ATSC 8-VSB service. CEA indicates that approximately 34,000 8-VSB DTV receivers have been sold in the U.S. This figure is hardly impressive, amounting to little more than one-thirtieth of one percent of U.S. TV households, but even this number overstates the growth of 8-VSB DTV service.³⁰ First, the majority of these units are likely to be 8-VSB receivers that were purchased by consumer electronics distributors and retailers, rather than consumers. Second, DTV receivers and display devices are often

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Plug the Right Answer?" "(May 9, 2000)
(<http://www.fcc.gov/Speeches/Kennard/2000/spwek011.html>).

³⁰ Until recently, CEA had maintained that the relevant figure for the DTV transition was the number of digital display devices sold to the public. As of May 1, this figure was 202,586. In April, however, CEA conceded that less than twenty percent of display devices sold were actually being operated in conjunction with DTV receivers capable of receiving 8-VSB service over the air. According to another source, the Wall Street Journal, more than 90% of all ATSC purchasers of digital display devices use those sets to receive digital satellite service or for watching DVD movies, rather than to receive 8-VSB DTV service. See "Mitsubishi Sees Its Digital-TV Sales in U.S. Rising," Wall Street Journal (May 5, 2000).

bundled with DBS equipment, and a significant proportion of the 8-VSB-capable display devices sold to consumers are likely being used to display programming distributed by a DBS provider. Clearly, unless a household is using its DTV receiver to receive ATSC 8-VSB DTV programming, its ownership of a DTV receiver should not be viewed as evidence of the growth and development of DTV service.

This lack of consumer acceptance jeopardizes the conversion to DTV and the recapture of the NTSC analog spectrum. While there is an ostensible deadline of 2006 for the return of broadcasters' NTSC spectrum, this action is ultimately contingent on sufficient DTV market penetration. Assuming that cable operators are not required to carry all operating DTV stations during the transition,³¹ broadcast stations in a given market will not be required to return their NTSC channels until eighty-five percent of the television households in that market have purchased a DTV receiver.³² With a single-mode ATSC 8-VSB standard, it will be many years before this threshold is reached in most TV markets and likely well after 2006 before all of the analog spectrum is returned. One research organization, Strategic Analytics, Inc., has even

³¹ In the Commission's digital must carry rulemaking proceeding, Sinclair argued that only cable operators with digital capability should be subject to a comprehensive DTV must carry requirement during the DTV transition. Comments of Sinclair Broadcast Group, Inc., CS Docket No. 98-120 (October 13, 1998). Clearly, it is uncertain whether the Commission will require full cable carriage of broadcasters' NTSC and DTV signals during that period.

³² See 47 U.S.C. § 309(j)(14)(B); *Sixth Order on Recon.* at para. 80. In the DTV environment, the receiver can be a set-top box that is distinct from a television set or display device. DTV receivers include (i) set-top boxes that receive digital television signals and permit those signals to be viewed over an enhanced display device, and (ii) set-top boxes that merely convert digital television signals into analog format for viewing on a conventional NTSC receiver. (The Communications Act distinguishes between these receivers at Section 309(j)(14)(B)(iii)(II).) While a DTV receiver and enhanced display device together currently average approximately \$7,000-8,000, a set-top box capable only of digital-to-analog conversion is likely to cost below approximately \$500 when it eventually becomes available.

concluded that less than 5% of U.S. TV households will be watching over-the-air 8-VSB DTV by 2005.³³

D. The commission should not squander this singular moment in the history of terrestrial broadcasting in the U.S.

The advent of digital technology has created vast new opportunities in all areas of telecommunications. With the shift to DTV, broadcasters, like other licensees, expected to have the flexibility to move forward with a variety of new business plans and strategies, and many are now preparing for that course with an entrepreneurial energy not seen in the broadcast industry for some time. With an eye towards the future, broadcasters are forming partnerships with a variety of technology providers, seeking innovative ways to use their digital spectrum to better serve consumers and their local communities, including ways that would reduce the importance of the weekly Nielsen ratings. At this early stage of digital development, it would be irresponsible for the Commission to stifle this new energy by condemning broadcasters alone to a technology that limits them to one, narrow business plan: a fixed data rate, rigid, residence-based, rooftop-antenna-delivered video service. If the Commission maintains exclusive reliance on the ATSC 8-VSB standard and deprives broadcasters of this singular opportunity to once more make their spectrum relevant, that stance will be a gross disservice both to those licensees and the public.

³³ See "Interactive and Digital Television: Issues in the Transition Phase," Strategic Analytics, Inc. (October 1999).

II. The Commission Should Give Considerable Weight to the Views of Broadcast Licensees, Rather Than Equipment and Chipset Manufacturers, As It Addresses the ATSC 8-VSB Reception Problem

A. Broadcasters have a huge stake in the success of the DTV transition, while equipment manufacturers are indifferent to the development of terrestrial broadcast DTV

In determining its DTV policies, the Commission should give considerable weight to the views and interests of its broadcast licensees. It is broadcasters that have more than fifty years experience in providing service to their local communities, that have spent extraordinary time and energy formulating business models for the digital environment, that have been required to make a huge investment in the digital conversion, and that have the most to lose if the DTV transition fails. As indicated above, Sinclair's Petition was supported by broadcasters representing more than 400 licensed commercial and public TV stations, and Sinclair believes that today approximately half of all licensed broadcast stations support the relief requested in that filing. In contrast, only a handful of broadcasters already emotionally committed to ATSC 8-VSB have expressed opposition to a flexible, dual-mode DTV modulation standard.

Conversely, the views of CEA and its members should carry less weight as the Commission considers how to proceed on the DTV modulation issue. Rather than operate licensed TV stations, CEA's member companies design, manufacture, distribute, and sell consumer electronics products. The goal of these companies is to sell as many digital display units as possible, without regard to how those purchasing these units will receive their digital content. Sinclair believes that the vast majority of equipment manufacturers have come to the conclusion that terrestrial broadcasting will play a minimal role in the digital video environment, and that video programming will be distributed primarily by cable operators, satellite systems, and pre-recorded media.

In Sinclair's view, it is this fundamental manufacturers' disinterest in the continued viability of terrestrial broadcasting that has led to the current quandary. Following the Commission's adoption of the ATSC 8-VSB standard, Sinclair believes that receiver manufacturers made the crucial decision that designing and mass producing DTV receivers that could work in conjunction with simple antennas under complex multipath conditions would be too difficult and expensive a challenge. As a result, they adopted the model for over-the-air DTV service that was utilized by ACATS in the mid-1990's during performance testing of the proposed DTV standard -- fixed residential television service received through a 30-foot rooftop or tower-mounted highly directional antenna. Despite their undoubted awareness that the majority of viewers of over-the-air broadcast television receive this service through a simple antenna, equipment and chipset manufacturers designed their DTV receivers to be able to receive a picture under the professional test conditions specified by ACATS. Unfortunately, and not unpredictably, it turned out that these DTV receivers perform extremely poorly under actual, real-world consumer conditions, much worse in fact than their NTSC counterparts.

Manufacturers' relative indifference to the fate of terrestrial broadcasting, reflected in this fundamental design decision, contrasts starkly with their continuing commitment to cable and satellite technology. Truly, the design of optimal technology for over-the-air broadcast reception has become a "lost art." With the embarrassing failure of ATSC 8-VSB reception now in the public spotlight, staring them squarely in the face, receiver and chipset manufacturers are scrambling to rediscover this art, although Sinclair and many other observers have serious doubts as to whether the current ATSC 8-VSB reception problem can ever be solved. It is this process of attempted rediscovery, rather than any action or lack thereof by broadcasters, that is in fact the true source of delay in the DTV transition.

For its part, CEA has publicly stated that the absence of progress in the DTV transition stems from broadcasters' failure to generate a sufficient volume of HDTV content.³⁴ In this effort to pin blame on broadcasters, CEA clearly banks on the audience's acceptance of its false premise that HDTV is the only legitimate use of the DTV spectrum. CEA should not have it that easy. Consistent with Commission policy, most broadcasters now view HDTV as only a niche service and are more interested in flexible business models that demand ease of reception and ubiquitous, reliable over-the-air service. If the ATSC 8-VSB standard offered broadcasters those capabilities, these flexible DTV applications would be driving the DTV transition forward rapidly, and the lack of HDTV programming would be irrelevant. The Commission should reject this latest CEA smokescreen.

B. The time has come for the Commission to stop relying on representations and promises from receiver and chip manufacturers

In rejecting Sinclair's Petition, the Commission relied heavily on claims from receiver and chipset manufacturers that a fix for the ATSC 8-VSB reception problems was imminent. It has been more than three months since that decision, and almost nine months since equipment manufacturers first promoted claims of a "breakthrough" that would resolve the 8-VSB reception issue. During this period -- geologic time in today's technology environment -- the equipment manufacturing community has failed to present any evidence that the ATSC's version of 8-VSB technology can support ease of reception and reliable over-the-air service to viewers with simple antennas in broadcasters' core business areas. All that these parties have placed into the record during this time are hypothetical and mathematical analyses and data from controlled laboratory tests, and this is not enough. The Commission should toughen its standard of proof on the ATSC

³⁴ See "122 Stations and Nothing On," Electronic News (April 17, 2000).

8-VSB modulation issue and demand nothing less than hard data on 8-VSB real-world performance that is gathered in a public forum and subject to professional peer review. The press statements, news releases, and other meaningless and self-serving marketing claims from receiver and chipset manufacturers should be rejected as irrelevant.

The most egregious example of unsubstantiated self-promotion during the past year were the announcements last year from Motorola and NxtWave – a company with no proven track record of performance -- regarding the development of the so-called “Miracle Chips.” In August and September 1999, these companies made sweeping claims regarding the performance of their new 8-VSB products. For instance, NxtWave stated that its new NXT2000 chipset would “deliver error-free indoor and mobile reception of broadcast digital signals to digital televisions, PCs and digital set-top boxes,” “provide the highest reliability and performance available,” “cancel transmission channel impairments such as static and dynamic multipath,” and “allow rapid channel surfing capability.”³⁵ Motorola indicated that its MCT2100 chip would “provide excellent signal reception even for the most extreme static and dynamic multipath signal ensembles,” and would be “a major step forward in implementing the perfect pictures and reliable data transmissions that the creators of the ATSC standard intended for DTV and HDTV.”³⁶

While the Commission cited these companies’ efforts in dismissing the Sinclair Petition, neither NxtWave nor Motorola has ever provided any evidence that these “breakthrough” chips provide any of these capabilities under real-world conditions. In fact, Motorola actually

³⁵ “NxtWave Communications’ Breakthrough Chip Makes Mobile and Indoor Reception of Broadcast Digital Television Possible,” Business Wire (August 24, 1999).

³⁶ “New Digital Receiver from Motorola Enhances 8-VSB Reception, Solves Multipath Problems,” Business Wire (August 23, 1999).

conceded the failure of its chip in a late 1999 test report, in which it explained its poor test performance by pointing out that real-world multipath conditions are much more complicated than those generated in the laboratory.³⁷

Now, more than six months later, with industry faith in this breakthrough technology quickly fading, NxtWave's CEO Matt Miller has announced the development of a "next-generation" miracle chip, the NXT2002, that purportedly enables 8-VSB broadcasters to overcome complex multipath conditions and also provide mobile and portable service – namely, the very capabilities that NxtWave's August 1999 chip, the NXT2000, supposedly provided.³⁸ Once again, however, Miller has provided no meaningful data to support these claims. Without such evidence, and with COFDM having established a new performance benchmark for DTV reception, how long should the Commission believe Mr. Miller's promises? For how long, and at what risk, should the Commission continue to view Mr. Miller as a credible source regarding the development of ATSC's version of 8-VSB technology? Even if the chip promised by Mr. Miller does emerge, what guarantee do broadcasters have that equipment manufacturers will actually incorporate that technology into their DTV receivers? More fundamentally, given the likely indifference of the equipment manufacturing community to the development of terrestrial

³⁷ See "Field Test Report on the MCT2100 Evaluation System – Philadelphia, PA," Motorola DTV Operation (November 24, 1999); <http://mot-sps.com/adc/pdf/2100phprt.pdf>. This report states the following in its conclusion: "The field test clearly reveals that multipath in the real world is much more complicated than what we are able to generate in a lab with a 6-ray dynamic ghost simulator. The field tests also revealed that the spectrum analyzer display is not always a good indication of the severity of a multipath channel. We often observed channels which had a "reasonable" looking spectrum and yet were unreceivable, while others had deep notches at particular frequencies and were received without difficulty. It was revealing, though unfortunate, to find that in many sites (or antenna positions at a site)."

DTV service, why should these manufacturers and their allies be believed at all on these crucial issues?

If the Commission continues to rely on such promises from the equipment manufacturing community and leaves the DTV modulation standard unchanged, this blind adherence to the status quo will likely doom the DTV transition to continued failure and bring an end to free, diverse, multiple-voice, local over-the-air broadcast television. If CEA and its member manufacturers think they can reinvent the ATSC 8-VSB standard, Sinclair does not contend that they should be denied that opportunity. At the same time, Sinclair and others believe that an 8-VSB-based solution to the current DTV reception problem is unlikely at least for the next several years, and manufacturers' salvage efforts should not be permitted to jeopardize broadcasters' enormous investment in the DTV transition. Broadcasters need assured access to a proven DTV delivery system, rather than a path that is reliant on speculative and uncertain technological developments by a few manufacturers of DTV receivers and semiconductor chips.

III. The Commission Should Permit Broadcasters to Operate Using COFDM-based Technology

The ATSC 8-VSB reception problem is now acknowledged by most relevant observers, and, after all these months, there is no credible evidence that an ATSC 8-VSB solution will be available in the foreseeable future. The Commission cannot escape its responsibilities any longer -- it is time for it to initiate a rulemaking on these DTV modulation issues. As Commissioner Susan Ness herself said in January 2000, "If improvements are not made that address the issues

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³⁸ See "Chip promises to bring portable capabilities to U.S. 8-VSB standard," *Electronic Engineering Times* (April 24, 2000).